

## (12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau



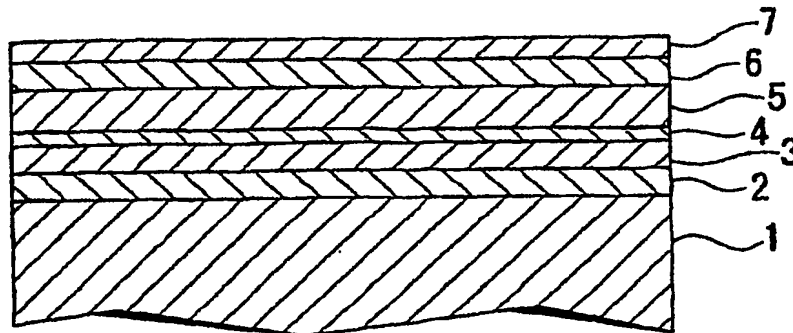
(43) International Publication Date  
21 October 2004 (21.10.2004)

PCT

(10) International Publication Number  
**WO 2004/090873 A1**

- (51) International Patent Classification<sup>7</sup>: **G11B 5/66**
- (21) International Application Number:  
PCT/JP2004/004959
- (22) International Filing Date: 6 April 2004 (06.04.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
2003-103367 7 April 2003 (07.04.2003) JP  
60/461,802 11 April 2003 (11.04.2003) US
- (71) Applicant (for all designated States except US): **SHOWA DENKO K. K.** [JP/JP]; 13-9, Shiba Daimon 1-chome, Minato-ku, Tokyo 105-8518 (JP).
- (72) Inventor; and  
(75) Inventor/Applicant (for US only): **OSAWA, Hiroshi** [JP/JP]; c/o Showa Denko HD K.K., 5-1, Yamata Kaigan dori, Ichihara-shi, Chiba 290-0067 (JP).
- (74) Agents: **SHIGA, Masatake et al.**; 2-3-1, Yaesu, Chuo-ku, Tokyo 104-8453 (JP).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:  
— with international search report
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **MAGNETIC RECORDING MEDIUM, PRODUCTION PROCESS THEREFOR, AND MAGNETIC RECORDING AND REPRODUCING APPARATUS**



(57) Abstract: An object of the present invention is to provide a magnetic recording medium which can reduce media noise. The present invention provides a magnetic recording medium comprising at least a non-magnetic undercoat layer, a first magnetic layer, a non-magnetic coupling layer, a second magnetic layer, and a protective layer, in this order, on a non-magnetic substrate, wherein the second magnetic layer is anti-ferromagnetically coupled with the first magnetic layer, and the first magnetic layer is made of a CoCrZr alloy.